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ABSTRACT

This teaching unit, Kern County Petroleum, is one in a series of curriculum guides developed by Project CHOICE (Children Have Options in Career Education) to provide the classroom teacher with a source of career-related activities linking 5th and 6th grade elementary classroom experiences with the world of work. These ten lessons about petroleum in Kern County, California, give background information and functions of the petroleum industry, including definitions, methods of the drilling, extraction, and refining process. An introductory section gives the rationale for the unit, goals, performance objectives, entry-level assessment, and evaluation. A list of suggested instructional materials, such as films, filmstrips, books, community resources, and art supplies, is included in this section. Each lesson contains a statement of purpose, materials needed for the lesson, an introductory statement, class activities, and a summary activity. Written materials (such as worksheets, surveys, and task cards) are included where feasible. (MEK)

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OFFICE OF CLAUDE W. RICHARDSON
KERN COUNTY SUPERINTENDENT OF SCHOOLS
Division of Instructional Services

Project CHOICE
#79

A CAREER UNIT FOR GRADES 5 AND 6

KERN COUNTY PETROLEUM

(Agribusiness and Natural Resources Career Cluster)

CE

September, 1979

U S DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

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FOREWORD

Project CHOICE: Children Have Options in Career Education, is an Exemplary Project from the San Diego City School District, which has been adapted, with ESEA Title IV-C funding, for Kern County schools.

Through Project CHOICE, units have been developed to provide the classroom teacher with a source of career-related activities linking classroom experiences with the world of work. All students, regardless of their post-high school plans, share an equal need for career awareness, decision making skills, and other elements of career education. This goal can be accomplished if all teachers and counselors "fit" the appropriate units where they best apply in the curriculum.

This unit has been especially written for Kern County by:

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KERN COUNTY PETROLEUM

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Agribusiness and Natural Resources Career Cluster

KERN COUNTY PETROLEUM

RATIONALE

The petroleum industry is a major factor in the economy of Kern County. This unit is designed to help familiarize students with this industry in their own area.

GOALS

Through this unit, pupils will:

-Become familiar with the work of the petroleum geologist.

-Become familiar with techniques used in drilling for oil.

-Become familiar with the method used to extract oil from the earth.

-Become familiar with the various means of transporting crude oil from one location to another.

-Become aware of the many by-products of petroleum.

PERFORMANCE OBJECTIVES

By the end of this unit, pupils will be able to:

-Define petroleum.

-Explain briefly how companies drill for oil.

-Explain briefly how oil is extracted from the earth.

-Name at least three means of transporting crude oil.

-Explain briefly the oil refining process.

-Name at least five by-products of petroleum.

ENTRY LEVEL ASSESSMENT
(To be used as a pretest and post-test).

Informal inventory to determine the class awareness of the petroleum industry. Responses could be taped or written and compared to the responses on the post-test, or the questions could be given on an individual basis in the form of a quiz.

1. Define the word "petroleum".

2. Explain briefly how a company would drill for oil.

3. Explain briefly how the oil is extracted from the earth once it is located.

4. Name at least three means of transporting crude oil from place to place.

5. Explain briefly the oil refining process.

6. Name at least five by-products of petroleum.

EVALUATION

The final lesson has been set aside for evaluation. The Entry Level Assessment may be used as a pretest as well as a post-test, or the teacher may wish to develop his/her own. Responses may be taped or written, so that comparisons may be made in order to determine how well pupils have achieved the objectives.

SUGGESTED INSTRUCTIONAL MATERIALS

Books:

The First Book of Oil - Beatrice Shilstone; Franklin Watts Inc. 575 Lexington Ave. New York, N.Y. 10022

Magic of Steel and Oil, History, Development and Uses - Robert Webb; Charles E. Merrill Books Inc. 1300 Alum Creek Dr. Columbus 16, Ohio.

Facts About Oil - American Petroleum Institute; 2101 L. Street Northwest; Washington, D.C. 20037

The Story of Oil - Chevron U.S.A. Inc.; 575 Market Street. San Francisco, CA 94105

AVAILABLE IN INSTRUCTIONAL RESOURCE CENTER: OFFICE OF THE KERN COUNTY SUPERINTENDENT OF SCHOOLS
(Please preview first, to be certain of suitability for specific students and situations).

Films:	MP	5912	Drilling for Oil in California
	MP	6590	Oil from California Wells-Refining Process
	MP	6579	Oil from California Wells-How Products are Used
	SP		Petroleum In Our Lives

Films available through Shell Film Library:
1433 Sadlier Circle W. Drive; Indianapolis, Ind. 46239

COMMUNITY RESOURCES

Phil Ryall; Petroleum Geologist; 602 H Street; Bakersfield, CA; 323-7759.

Harold Williams; Petroleum Drilling expert; Lunn Production Service; 4044 Burr Street; Bakersfield, CA; 324-4252.

Ray Hill; Transportation of Crude Oil; Phillips Petroleum Co.; 5405 Stockdale Highway; Bakersfield, CA; 833-6600.

Mike Zuniga; Lion Oil Refinery; 2201 Fruitvale Ave; Bakersfield,CA; 327-2121.

Art Starr; Petroleum by-products; Mobil Chemical Co.; 2024 Norris Rd.; Bakersfield, CA; 399-1761.

TASK CARDS

The task cards, pages 15 - 38, may be used at the discretion of the teacher. They may be used by students individually or in small groups, as a part of the lessons or for extra credit.

INSTRUCTIONAL STRATEGY: LESSONS 1 - 10

Lesson 1

PURPOSE — To familiarize students with the way that petroleum is formed in the earth.

MATERIALS — 1. Book: The First Book of Oil; Shilstone.

INTRODUCTION — Say: "We live in an age in which people are concerned about sources of energy. A very old and important source of energy is petroleum. We happen to live in an area that is relatively rich in this material resource. We are going to investigate this source of energy and learn how it effects our lives."

CLASS ACTIVITY — Read aloud and discuss pages 10-18 of The First Book of Oil. Any suitable alternate source will suffice if it covers the petroleum formation process.

SUMMARY — Review some of the new terms which were introduced. Discuss the process of petroleum formations. Have students draw a picture story (time line or cartoon strip are possible formats) depicting petroleum formation.

Lesson 2

PURPOSE To familiarize students with the work of a petroleum geologist.

MATERIALS Resource person: local petroleum geologist (see suggestions in Community Resources section).

INTRODUCTION Say: "We have learned how a very important source of energy, petroleum, is formed inside the earth. In order to use this valuable resource we must first locate it, get it out of the earth."
"Today we are going to learn how petroleum geologists help us to locate this material which lies underground."

CLASS ACTIVITIES

1. Listen to a petroleum geologist guest speaker.
2. Question, answer, and discussion period.

SUMMARY Review those things which were learned from listening to the speaker. Have students write thank you notes to the speaker while the new information is fresh in their minds. Remind them to specify something they learned when writing the note. This will have a double dividend: first it will let the speaker know that the speech was helpful and informative; second it will help the student remember that which was learned.

Note: If it is absolutely impossible to get a petroleum geologist as a guest speaker this material can be covered by using books. Suggested Material: First Book of Oil pages 28-35. The Magic of Steel and Oil pages 47-49.

Lesson 3

PURPOSE

To familiarize students with the various phases of the petroleum industry up through the drilling stage.

MATERIALS

1. Suggested film: Drilling for Oil, 5912 (Available in Instructional Resource Center, Superintendent of Schools).
2. Film projector.
3. Chart paper.
4. Felt pen.

INTRODUCTION

Say: "Today we are going to further our investigation of the petroleum industry. As you watch this film notice how many different types of jobs are involved in the locating and extracting of the petroleum that is in our earth."

CLASS ACTIVITIES

1. View film.
2. Discuss film.
3. Develop "job cluster" list.

SUMMARY

Children will begin to realize that the oil industry does not just randomly drill a hole in the ground and out spurts oil.

Lesson 4

PURPOSE	To help students understand the method used to extract crude oil from the earth.
MATERIALS	Resource person from a drilling company (see suggestions in Community Resources section).
INTRODUCTION	Say: "We have learned how petroleum is formed inside the earth. We know now how petroleum geologists are able to scientifically locate this natural resource. The next step toward using petroleum for a source of energy is extracting the product from the earth. Today we are going to look at some model equipment which will help us understand how the petroleum is taken out of the ground."
CLASS ACTIVITY	Have a guest speaker from a drilling company speak to the class and demonstrate how the petroleum is taken out of the ground. Allow time for questions, answers, and discussion.
SUMMARY	Discuss and review that which was learned today. Have students write thank you notes with specific statements while the information is fresh in their minds.

Note: If the suggested format of this lesson is not possible to use, the information is covered in The First Book of Oil pages 36-56 and The Magic of Steel and Oil pages 41-46.

Lesson 5

PURPOSE

To familiarize students with the various means of transportation used to move crude oil around the world.

MATERIALS

1. Resource person: someone from an oil company who is in charge of crude oil transportation (see suggestions in Community Resources section).

   AND/OR

2. Books: The First Book of Oil, Shilstone
   The Magic of Steel and Oil, Webb.

INTRODUCTION

Say: "As we know now, petroleum is formed underground only in certain areas where conditions have been just right. Because of this fact, it is necessary to move large amounts of crude oil many miles in order for it to be refined and used. Today we are going to learn what means of transportation are used to accomplish this task."

CLASS ACTIVITIES

1. Listen to a guest speaker who is in charge of crude oil transportation for an oil company.
   OR
2. Cover material in The First Book of Oil pages 57-68 and The Magic of Steel and Oil pages 50-54.

SUMMARY

1. Review and discuss the new knowledge gained. Have students write thank you notes containing specific statements about something they learned.
   OR
2. Have students write a story which compares transportation methods used in the mid 1800's to those used today.

Lesson 6

PURPOSE To acquaint students with the various processes of oil refining.

MATERIALS

1. Film; Oil from California-Refining Process, 6590. (Available in Instructional Resource Center, Superintendent of Schools).
2. Film projector.

INTRODUCTION Say: "Once petroleum has been formed, located, extracted and transported, it must go through a process called refining before it is useful fuel. Today we are going to learn that there are several ways that refining can be accomplished. We are going to learn a little bit about each method. Let's see what we can learn today."

CLASS ACTIVITIES

1. View training film from Shell.
2. Discuss film ideas.

SUMMARY Students will become acquainted with the various methods used to refine oil.

Lesson 7

PURPOSE To help students more fully understand the various methods of refining petroleum.

MATERIALS Resource person who can explain refining process (see suggestions in Community Resources section).

INTRODUCTION Say: "We have seen a film which showed us the various methods of oil refining. I'm sure that as we watched the film, you saw many new and interesting things. Today we are going to listen to a guest speaker who will further explain the refining process and answer our questions."

CLASS ACTIVITY Listen to guest speaker from a nearby refinery explain the various refining methods. Allow time for questions and answers.

SUMMARY This lesson should help to make the refining process more understandable for the students because, when coupled with lesson 6, the students are given the advantages of visual messages and the opportunity for two-way communication.
Prompt and specific thank you notes should be sent to the guest speaker.

Lesson 8

PURPOSE	To afford students the opportunity to see the refining process themselves.
MATERIALS	Field trip arrangements to visit an oil refinery (see suggestions in Community Resources section).
INTRODUCTION	Say: "We have had two previews of the oil refining process. Remember we have seen a film and listened to a speaker. Today we are going to have an opportunity to see this process up close. We are going to see how many people and machines this industry involves. Today we are going to visit an oil refinery."
CLASS ACTIVITY	Forewarn the students to be cautious and courteous while visiting the refinery. Visit the refinery.
SUMMARY	This experience will be extremely informative but remember that a debriefing session is essential to insure the maximum retention of this knowledge. Have students write thank you notes which specify something which they learned or enjoyed seeing.

Lesson 9

PURPOSE — To help students become aware of a variety of petroleum by-products.

MATERIALS

1. Chart paper.
2. Felt pens, two colors.
3. Various books on the subject of petroleum uses (from your school or public library).

INTRODUCTION — Say: "We have seen how crude oil can be refined to various degrees. We have learned what these important petroleum products are used for. Today we are going to begin learning about petroleum by-products. A by-product is a secondary product. That means that even after petroleum is refined, some of it is taken through even more processes in order to make other products."

CLASS ACTIVITY — Ask students for a list of petroleum by-products. Record their dictated list in one color on the chart paper. When their ideas are exhausted, say "Now we'll investigate to see if we've left any out."
Read The First Book of Oil, pages 4-9 and The Magic of Steel and Oil, pages 57-60.
Continue the list in another color. It may be interesting to leave the list up for several days to add to it.

SUMMARY — Students will become aware of the fact that petroleum plays a large part in our modern life and would be an important part of our lifestyle even if it were not used as a fuel.

Lesson 10

PURPOSE To afford students the opportunity to see the production of a petroleum by-product.

MATERIALS Field trip arrangements to visit a by-product manufacturing plant (see suggestions in Community Resource section).

INTRODUCTION Say: "We have developed a long list of petroleum by-products. Today we are going to see the production of one or more of these by-products.

CLASS ACTIVITIES

1. Visit any type of a manufacturing plant which produces any type of a petroleum by-product.
2. Discuss the things you learned on the trip.

SUMMARY Students will begin to recognize the fact that petroleum provides the people in our area many "things" but also many jobs.

EVALUATION

PURPOSE

To enable students to assess their knowledge and understanding of the petroleum industry and its importance to Kern County.

MATERIALS

1. Tape recorder, or pencil and paper.
2. Tape from pre-test, or written pre-test.
3. Entry Level Assessment.
4. All task cards.

INTRODUCTION

Say: "Today we will find out how much we have learned about the petroleum industry in Kern County. Let's listen to the tape we made at the beginning of the unit, then we'll find out how much more we know now."

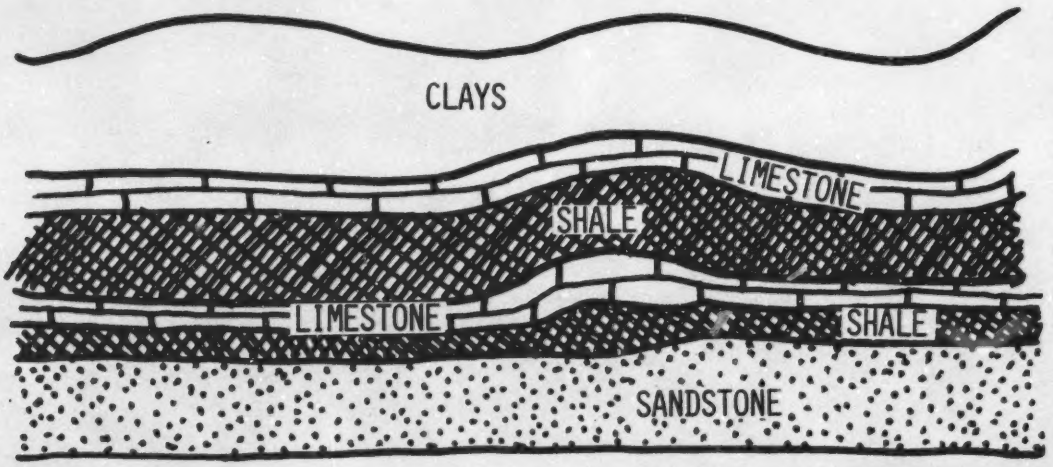
CLASS ACTIVITIES

1. Listen to pre-test tape, or read over results of written pre-test.
2. Take post-test.
3. Free use of task cards.

SUMMARY

The students should feel free to talk about what they have enjoyed and disliked about the unit.

EXPERIMENT



You need:

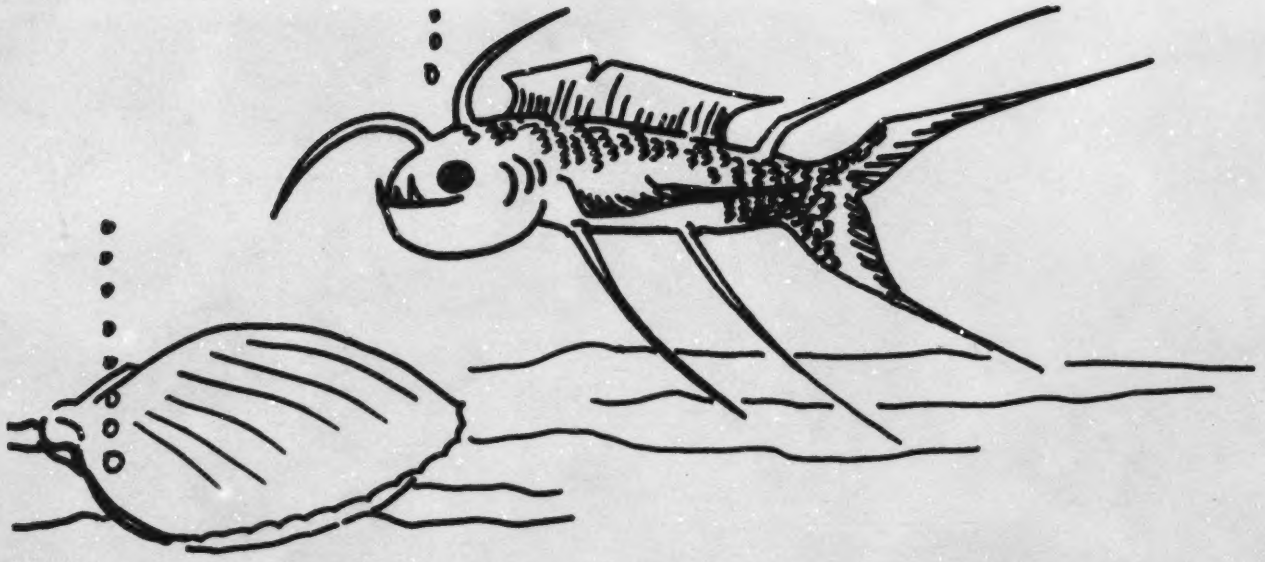
1. a sponge
2. an eyedropper
3. a bowl (large enough to hold the sponge)
4. water

You have learned that oil is often trapped beneath the earth's surface in layers of porous rocks, generally sandstone or limestone. Extracting this oil is more time consuming than extracting oil from an oil trap.

Place the dry sponge flat in the bottom of the bowl. Pour just enough water in the bowl to saturate the sponge. Wring all of the water from the sponge and remove sponge from the bowl. See how long it takes you to empty the water from the bowl using the eyedropper. This is similar to the process of extracting oil from an underground oil trap.

Now repeat the process but leave the saturated sponge in the bowl and remove the water by inserting the eyedropper into the sponge. Pretending that the sponge is sandstone and the water is oil, this is similar to the process of extracting oil from the earth which is trapped in a layer of porous rock.

Keeping your experiment in mind, answer this question: If you were drilling for oil, would you rather find an underground oil trap or a layer of porous rock which was rich in oil? Explain your answer.



You need:

1. art paper
2. pencils
3. crayons

You have learned that the formation of oil is a long process which takes place underwater.

Draw a picture story which shows the process of oil formation. Remember that many of the tiny sea creatures that were involved in this process long ago, no longer exist. So use your imagination. What do you think they looked like?

You need:

1. art paper
2. pencils
3. crayon
4. a resource book to look at

You now know that there are three main kinds of oil traps:

1. Anticlines
2. Stratigraphics
3. Faults

Of course, oil can also be trapped in a salt dome.

Choose one type of an oil trap to study. Draw a picture of this trap. Label the layers of the earth. Write a brief statement about this type of oil trap.

TASK CARD 4

RESEARCH

You need:

1. a map of the United States
2. a pencil or marking pen
3. some resource books or materials

Petroleum is not found in all areas of the world. Some areas are rich in petroleum, others have none.

Do some research on your own. Find what areas of the United States are rich in petroleum. Indicate these areas on your map.

BE CREATIVE

You have studied the main types of oil traps and are familiar with them.

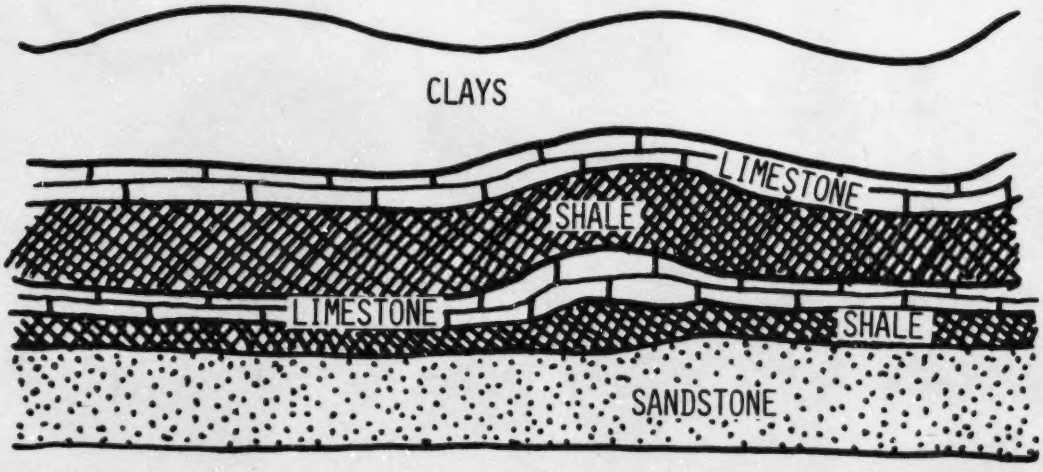
You need:

1. cardboard
2. glue
3. pencil
4. barley-(for shale)
5. sand-(for sand-stone)
6. rice-(for lime-stone)
7. black paint-(for oil)
8. sawdust-(for clay)
9. clear enamel spray

With your pencil, draw a picture of one of the types of oil traps. Paint each layer with glue (one at a time) and apply the appropriate material indicated above to complete your model of an oil trap.

Coat your model with clear enamel spray to help make it stay nice longer.

RESEARCH PROJECT



You need:

1. writing paper
2. pencil
3. resource materials regarding petroleum geology

You know that a petroleum geologist studies the earth in order to locate petroleum deposits.

Do some research to learn how petroleum geologists performed their job in the mid 1800's and how they perform their job today.

Write a story explaining how the work of a petroleum geologist has changed in the past 100 years.

BE AN ARTIST

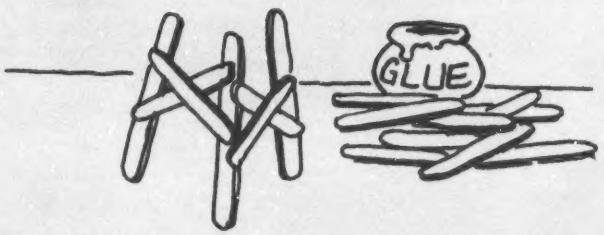
You need:

1. drawing paper
2. colored pencils
3. resource material which shows an oil drilling rig and its parts (suggested The Magic of Steel and Oil page 42.)

Draw a picture of an oil drilling rig and label as many of the parts as you can.

TASK CARD 8

CONSTRUCTION PROJECT



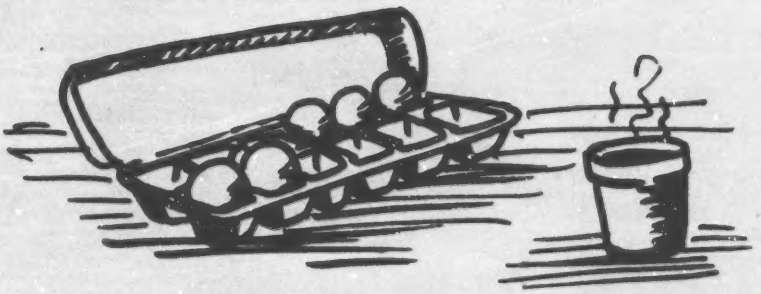
You need:

1. popsicle sticks or smaller pieces of wood
2. string or wire
3. drinking straws
4. miscellaneous materials that can be used as parts of model
5. glue

You are pretty familiar now with the parts of an oil drilling rig.

Use your imagination, constructing a model of an oil drilling rig.

COLLAGE



You need:

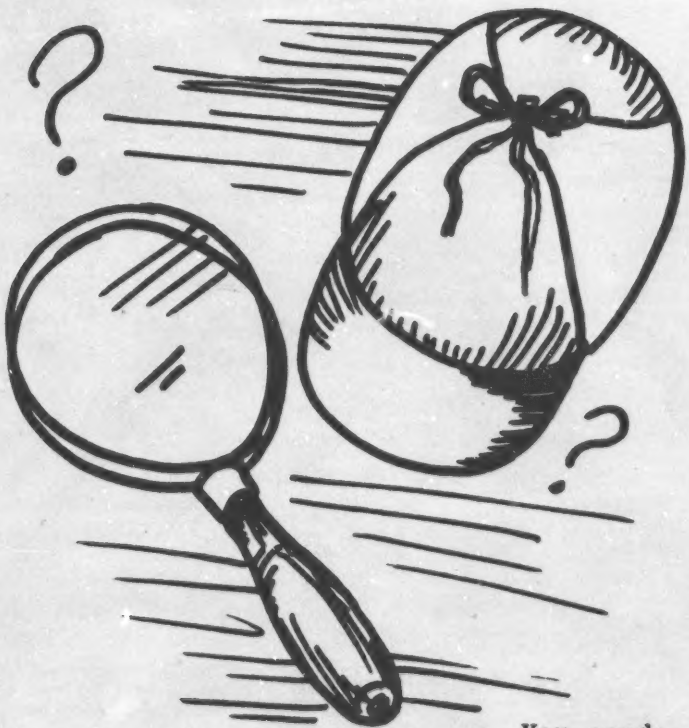
1. poster paper
2. scissors
3. paste or glue
4. old magazines

You have learned that petroleum is used not only as a fuel but also has many important by-products.

Cut out pictures of as many petroleum by-products as you can possibly find.

Use these pictures to make a nice collage of petroleum by-products.

BE A DETECTIVE



You need:

1. pencil
2. paper

You have learned that we depend heavily on petroleum as a fuel.

Investigate your own home. See how many things you have in your home that use some form of petroleum as a fuel.

Record these items on a list.

*Hint: It would be fun to do this project with a partner and see who can find the most.

MAKE A SCRAPBOOK!

You need:

1. several current newspapers
2. scissors
3. construction paper folder
4. plain paper for scrapbook pages

You realize how very important petroleum is to our way of life. You know too, that the current news reflects those things which we are concerned with.

Scan the newspapers to find articles that are about petroleum or petroleum by-products. Cut out all petroleum related articles. Make a scrapbook of these articles.

YOU BE THE SCIENTIST

You need:

1. a small amount of oil (any type)
2. an equal amount of water
3. a glass or clear plastic container with tight lid that will hold the oil and water when combined
4. pencil
5. paper

You have been studying petroleum and are aware of the characteristics of oil.

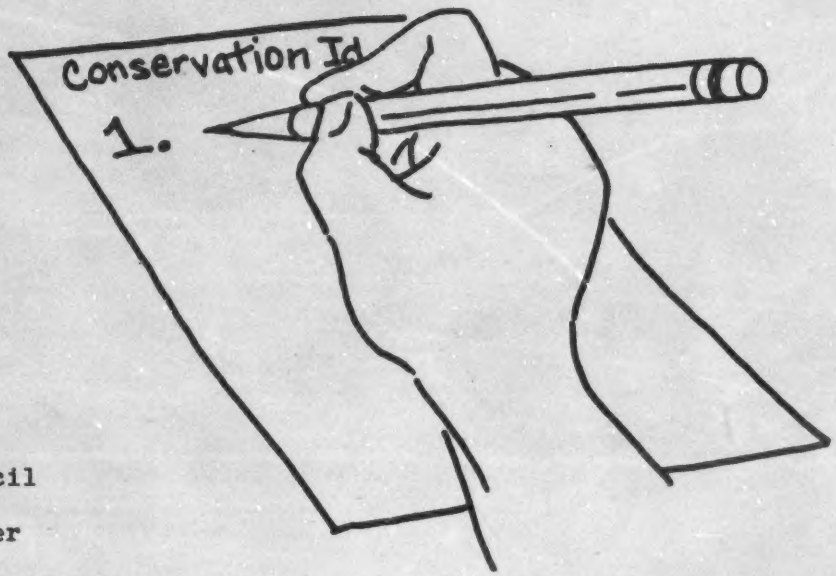
Feel the oil with your finger. Feel the water with your finger. Compare the weight of the two equal parts of oil and water. Make a guess as to which is heavier the oil or the water. Write down your guess.

Pour both the oil and water into the large container, put on the lid and shake up well.

Watch mixture to see what happens - record the results. Write a paragraph telling what happened.

TASK CARD 14

LET'S CONSERVE



You need:

1. pencil
2. paper
3. good ideas

You know that we are using petroleum faster than it is being formed. You know also that we are in danger of exhausting this natural resource.

Make a list of things that we can all do to help conserve petroleum.

*Hint: It would be fun to have a contest to see who can think of the most conservation ideas.

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LET'S INTERVIEW

You need:

1. pencil
2. paper
3. good manners
4. good questions

You are becoming very aware of the importance of petroleum in our lives. You have learned that many people have jobs that are petroleum related.

Make an appointment with the owner of a nearby gas station. Be on time for your appointment and be prepared with a good list of questions. Conduct a brief interview with the owner, and record your findings. Remember to thank the businessman for his time. Write up a brief report about your interview. Perhaps you could share your findings with the class.

Here are a few ideas for questions to ask:

1. How many gallons of gas does this station sell on an average day?
2. When serving customers, what is the most important thing to remember?
3. What subjects did you learn in school that are very important in your job?
4. Other than gas what petroleum products do you sell?
5. What do you see as the main difference between gas stations today and gas stations when you were a child?

You need:

1. pencil
2. paper
3. good manners
4. good questions

You know that the petroleum industry employs many people in our area.

Make an appointment for an interview with any person who is employed in a petroleum related job. Be on time for your appointment and be prepared with a good list of questions. Conduct a brief interview with this person and record your findings. Remember to thank the person you have interviewed for giving you some of their time.

Write up a brief report about your interview. Perhaps you could share your findings with the class.

Here are a few ideas of people to schedule your interview with:

1. an oilfield worker
2. a trucker that hauls petroleum products
3. a person who works in a refinery
4. a person who fuels planes at the airport
5. a bus driver

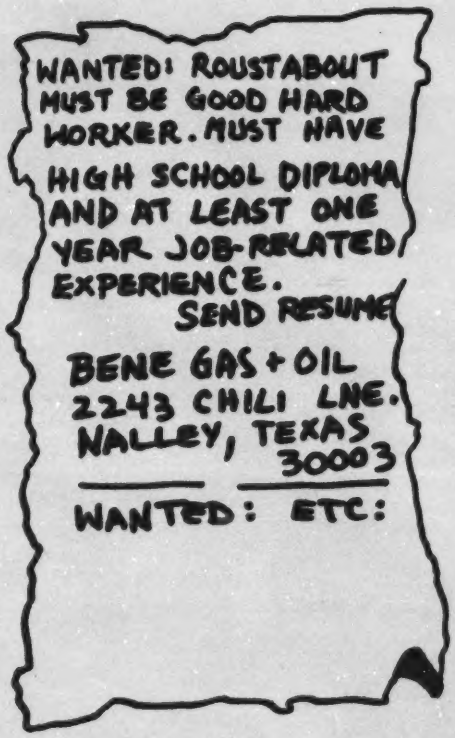
Here are a few ideas for questions to ask:

1. If there were suddenly no more petroleum, what would happen to your job?
2. Could some other product take the place of petroleum in your job?
3. What is the most important thing you do on your job?
4. Are there any dangers in your job - if so what?
5. What subjects did you learn in school that are important in your job?

WRITE AN AD

You need:

1. pencil
2. paper for writing
3. poster paper
4. crayons, paints or magazine cut out pictures



You now realize that there is a wide variety of jobs that are petroleum related. Choose one petroleum related job that you feel you would enjoy having.

Write an advertisement for this job. Be sure to include education or experience requirements. Tell all the good and exciting things about the job that might make a person choose it for a career.

Make a poster to go with your advertisement.

TASK CARD 18

ACT IT OUT

You need:

1. a small group
2. a good imagination
3. your dramatic talent

Ad lib and role-play an incident that might take place in one of these petroleum related situations:

	Main Characters	Situations
1.	a. The president of a local refinery b. A group of concerned citizens	1. Steam pours out of the equipment at the refinery - the citizen group believes this is a polluting smoke.
2.	a. A gas station attendant b. A gas customer	2. The price of gas has taken a drastic jump, the customer feels this is unfair.
3.	The board of directors of the gas company	3. There is a real threat of a drastic fuel shortage. You want to convince the general public to conserve energy - what will you do?
4.	a. An economy car salesperson b. A family shopping for a car	4. The salesperson wants to convince the family that the economy car is just what they need. The family is in disagreement between a large luxury car and a small economy car.
5.	a. A gas station owner b. Several people applying for a job	5. The gas station owner needs a person to work in the business. The owner is giving interviews to people who want the job.

SAFETY FIRST

You need:

1. poster paper
2. pencil
3. paint or crayons

Petroleum products can be dangerous if handled carelessly.

Make a safety poster that will illustrate a safety rule regarding the handling of petroleum products.

TASK CARD 20

PETROLEUM JOBS

You need:

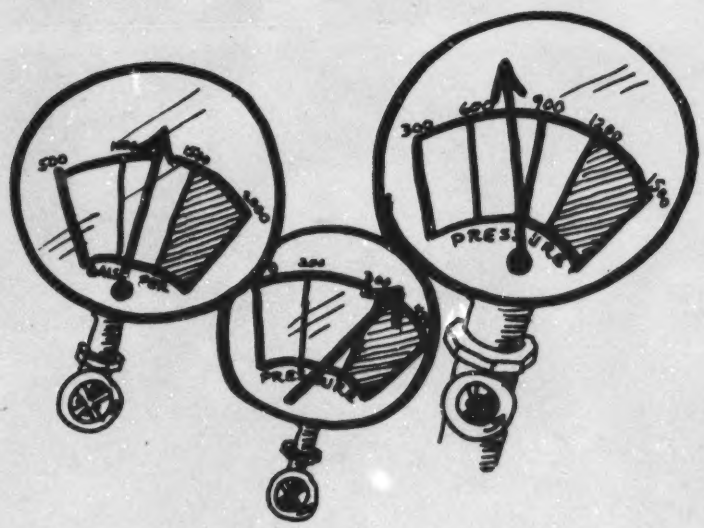
1. pencil
2. paper
3. good ideas

Choose a petroleum related job (gas station attendant, petroleum by-product designer, bus driver, refinery worker, gas meter reader, etc.) that you think you would like.

Write three paragraphs:

1. Describe the characteristics a person should have for this job.
2. What rewards would this job offer?
3. What disadvantages would this job have?

WRITE ON!



You need:

1. pencil
2. paper

Choose a petroleum related job. Consider the subjects we learn in school. How would the employee you've chosen use these skills:

Reading

Math

Science

Spelling

Writing

Speaking

TASK CARD 22

IT'S NOT JUST GAS

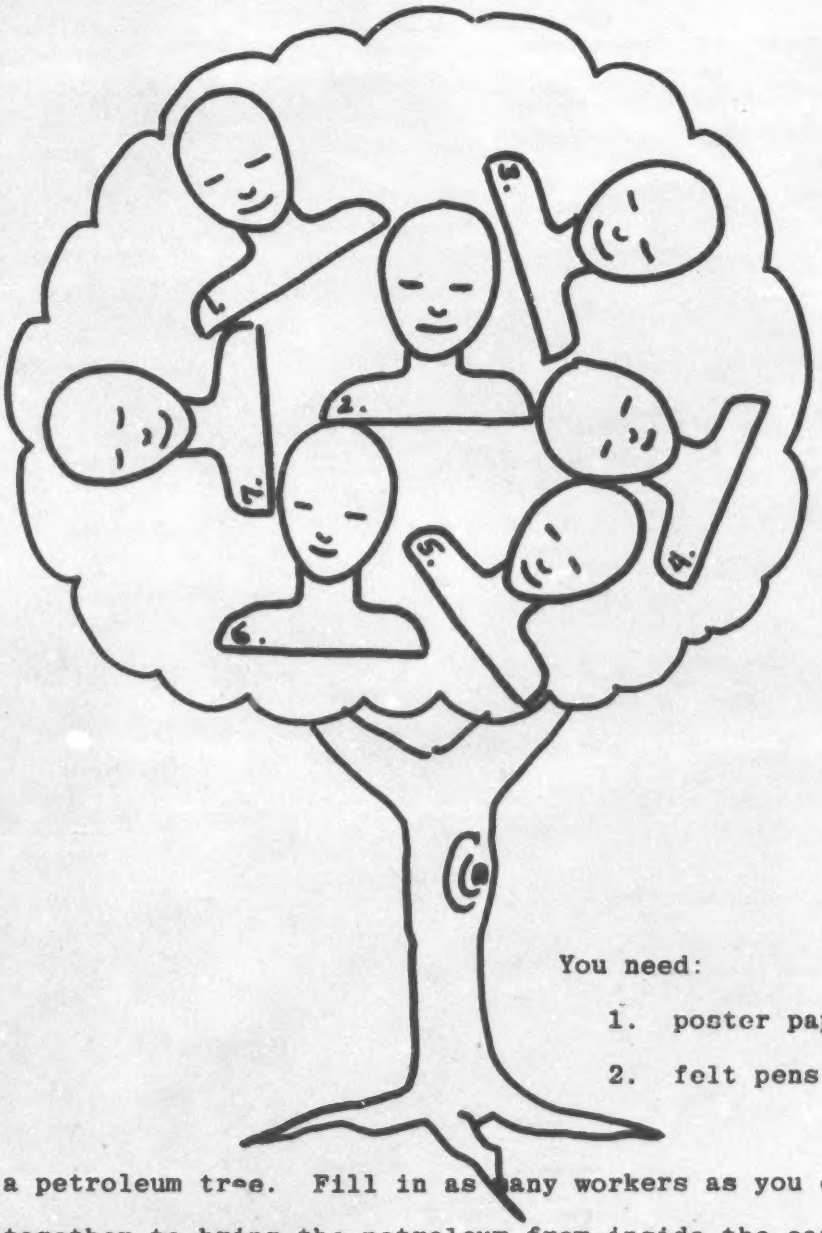
You need:

1. pencil
2. paper

List as many jobs as you possibly can that are in someway petroleum related.

It would be fun to have a contest to see who can think of the most jobs.

PETROLEUM DOESN'T GROW ON TREES

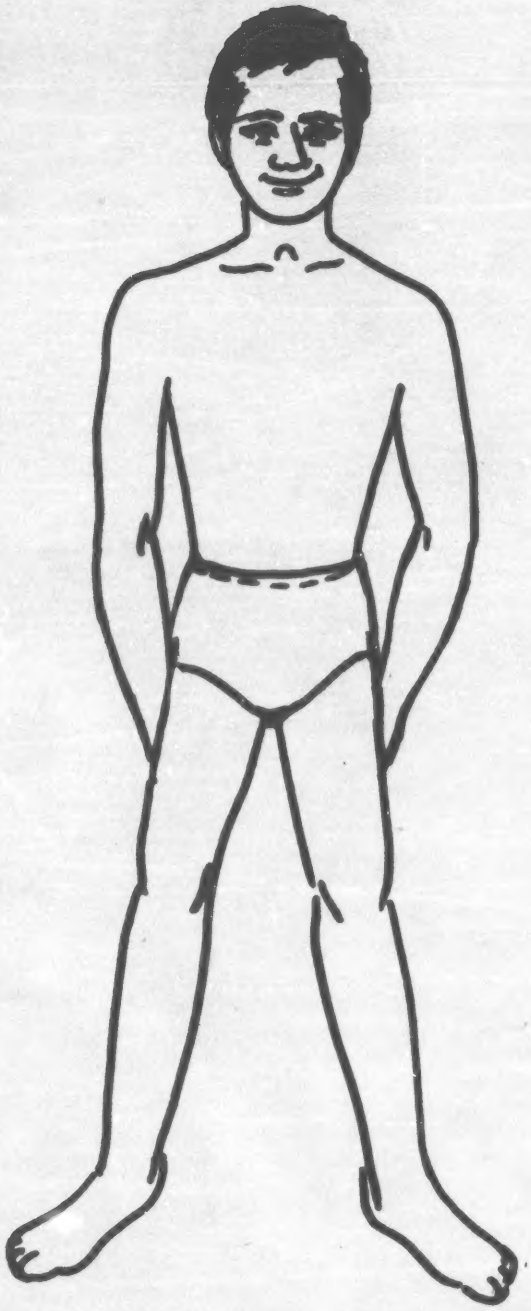


You need:

1. poster paper
2. felt pens

Make a petroleum tree. Fill in as many workers as you can that work together to bring the petroleum from inside the earth into your homes or cars, etc.

TASK CARD 24



YOU'RE THE DESIGNER

You need:

1. paper
2. pencil
3. crayons or fabric scraps

You know that refinery operators are very concerned with their workers' safety.

Design a good uniform for refinery workers to wear. Remember to consider comfort and safety but pretend that money doesn't matter.